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Title: The first record of the genus *Fulvius* Stål, 1862 (Heteroptera: Miridae: Cylapinae) from continental China with description of a new species

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(Heteroptera: Miridae: Cylapinae)
from continental China with description of a new species****Jacek Gorczyca¹, Andrzej Wolski² & Artur Taszakowski^{3,*}**^{1,3}*Institute of Biology, Biotechnology and Environmental Protection, Faculty of Natural Sciences,
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Abstract. A new species of the genus *Fulvius* Stål, 1862 (Heteroptera: Miridae: Cylapinae: Fulviini) is described based on a couple of specimens collected in Yunnan Province in SW China. The genus is also reported from continental China for the first time. Detailed illustrations of the tarsi, the distribution of trichobothria on the metafemur and male genitalia are given, and an image of the dorsal habitus is presented.

Key words. Asia, biodiversity, new species, plant bugs, taxonomy, true bugs, Yunnan Province.

INTRODUCTION

Fulvius Stål, 1862 is known as one of the most speciose genera within the subfamily Cylapinae, with more than 80 valid species worldwide (Wolski et al. 2018). Nevertheless, the state of the knowledge about this genus is probably far from being complete. Most species occur in the New World and the Afrotropical and Oriental Regions. Only a few species are known from the Australian Region and very few have been described from the Palearctic Region (Gorczyca 2006). Little is known about the biology of the congeners. While most members of *Fulvius* are frequently collected using UV light traps, some of them are saproxylic and have been found on fallen decaying wood or often on fungi, sucking the fungal hyphae (Gossner & Damken 2018; Kim et al. 2019). On the other hand, some of them are carnivorous (Yasunaga & Miyamoto 2006; Pluot-Sigwalt & Cherot 2013).

While examining some material housed in the Department of Entomology at the National Museum of Natural History, Prague, Czech Republic, two specimens of the genus *Fulvius*, collected in Yunnan Province of SW China were found. These were confirmed as representing an undescribed species of *Fulvius*, which is described in this paper. This discovery also reveals the first distributional record for the genus from continental China.

MATERIAL AND METHODS

The specimens were imaged using the following equipment: a Leica M205C stereo microscope with a Leica DFC495 digital camera and Leica application suite 4.9.0 software; a Leica DM 3000 upright light microscope with a Leica MC 190 HD digital camera and Leica Application Suite 4.12.0 software and an Olympus upright light microscope with a Canon EOS 750D digital camera. SEM photographs were obtained using a Phenom XL field emission scanning electron microscope at 10 and 15 kV accelerating voltages using a BackScatter Detector (BSD). Measurements were taken with Leica application suite 4.9.0 software and are presented in millimetres (mm). The total body length is defined as the length from the apex of the clypeus to the posterior margin of the membrane. The measured body parts were defined in Wolski (2015). Genitalia were kept in 10% KOH solution before dissection, and the female genitalia were stained with chlorazol-black. The terminology of the male genitalic structures follows Kerzhner & Konstantinov (1999), Konstantinov (2003) and Cassis (2008), and the terminology of the female genitalia follows Davis (1955), Sadowska-Woda et al. (2006) and Pluot-Sigwalt & Matocq (2017).

RESULTS

Taxonomy

Fulvius yunnanicus sp. nov.

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Type material

Holotype (♂). China, Yunnan Prov., 1.8 km W Zizhi vill., 2.vii. 2016, 25°44.7' N, 98°33.6' E, 2005 m a.s.l., from large dead tree stumps, J. Hájek & J. Růžicka leg.; collection of the National Museum Praha, Czech Republic. **Paratype** (♀). Same data as for holotype; both are preserved in the Department of Entomology, the National Museum, Prague, Czech Republic.

Diagnosis. The new species belongs to the *anthocoroides*-group (see discussion below) and can be distinguished from other members of the group by the following combination of characters: pronotum dark brown with three brown longitudinal stripes spanning its whole length; antennal segments I–II dark brown to black with contrastingly yellow apical 1/4; legs entirely brown (Fig. 1); endosoma with large, oval sclerotized lobe apically (Fig. 4C); bursa copulatrix with ring-like sclerite situated near base of the seminal depository; sclerotized rings weakly developed (Fig. 5A).

Most similar to *F. mateusi* Sadowska-Woda & Gorczyca, 2008, *F. nigricornis* Poppius, 1909 and *F. tagalicus* Poppius, 1914 in sharing the uniformly coloured hemelytron. *F. yunnanicus* can, however, be easily distinguished from these species by having the pronotum with brown, longitudinal patches along entire length (Fig. 1) and the presence of the oval sclerotized lobe in the endosoma (Fig. 4C) (see remarks below).

DESCRIPTION

Male

Colouration (Fig. 1). Dorsum, pale brown with darker, mostly dark brown areas.

Head. Dark brown, tinged with yellow, first and second segment vary from dark brown to nearly black, second segment contrastingly yellow apically, third and fourth segments dark brown; labium brown, last segment dark brown.

Thorax. *Pronotal collar.* Brown. *Pronotum.* Dark brown with two brown longitudinal stripes. *Mesoscutum and scutellum.* Dark brown, scutellum pale at apex. *Thoracic pleura.* Proepimeron, mesepisternum and mesepimeron dark brown almost black. *Hemelytron.* Pale brown, partly translucent, exocorium slightly tinged with red; clavus pale brown at base, dark brown in apical part with large dark brown and reddish patch contiguous



Fig. 1. *Fulvius yunnanicus* sp. nov., holotype, dorsal view.

with clavus and membrane; cuneus dark brown, paler at apex; membrane grey, venation dark grey. Large areolar cell triangular; small areolar cell very small. *Legs.* Pale brown, femora in apical part slightly tinged with red.

Abdomen. Chestnut to dark brown.

Structure, texture and vestiture. Dorsum matte, covered with fine, pale, very short closely fitting, scale-like setae.

Head. Eyes contiguous with pronotal collar; first and second antennal segments covered with dark, short setae (Figs 1–2); second segment slightly thickened towards apex; third and fourth segments very thin, covered with pale, long, protruding setae. Labium reaches beyond metacoxae (Fig. 2C).

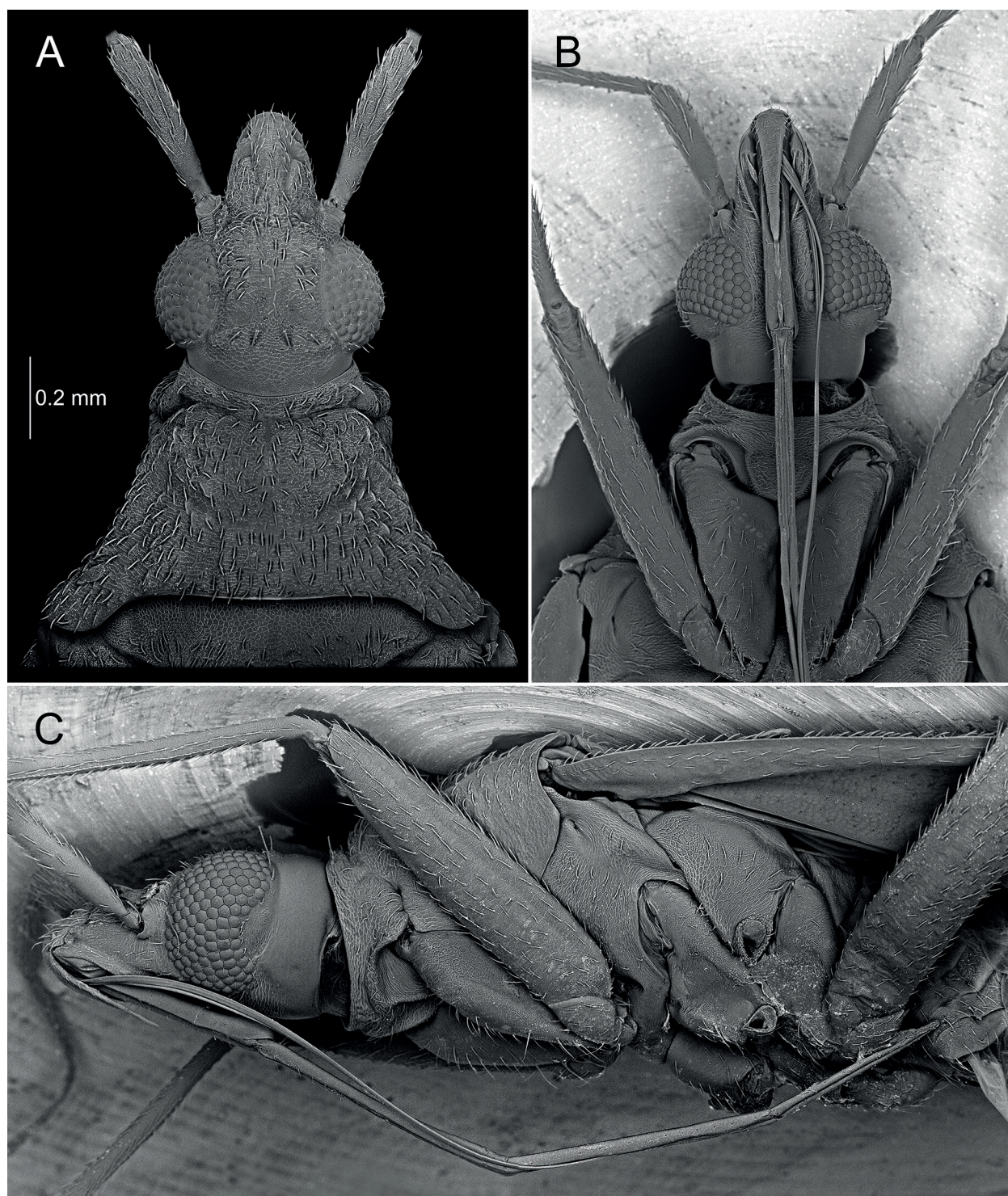


Fig. 2. *Fulvius yunnanicus* sp. nov., holotype, front part of the body. **A.** Dorsal view; **B.** Ventral view; **C.** Lateral view.

Thorax. Pronotum. Anterior lobe of pronotum only slightly convex with thin longitudinal sulcus medially (Fig. 2A).

Legs. Relatively long (Fig. 1), covered with very short setae, much shorter than diameter of tibiae; metafemora with nine trichobothria (Fig. 3C–E); tarsi two-segment-

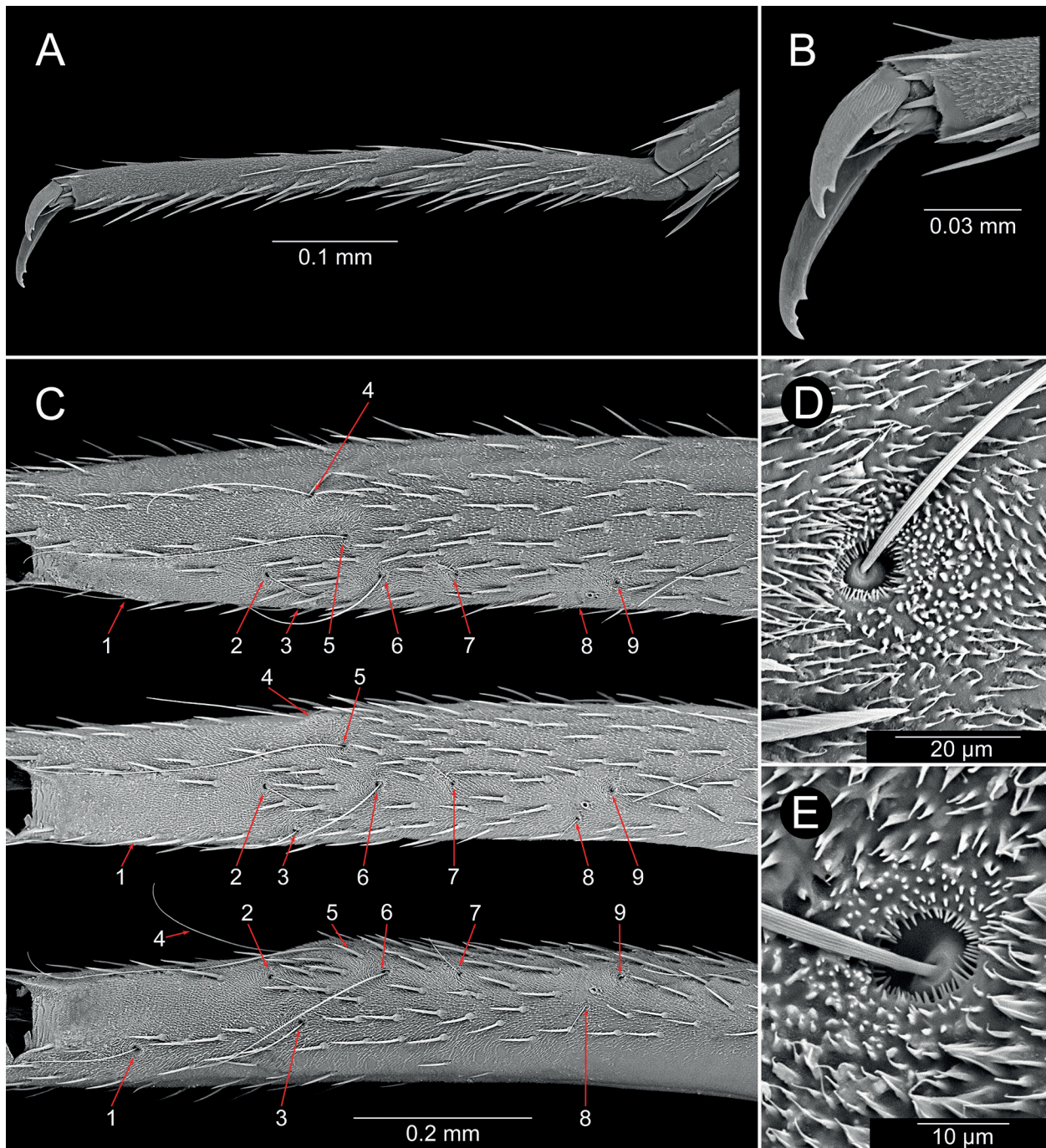


Fig. 3. *Fulvius yunnanicus* sp. nov. **A.** Paratype, metatarsus; **B.** Claws in details; **C.** Holotype, distribution of trichobothria on the metafemur; **D–E.** Details of the structure of the trichobothria.

ed, second segment not divided; claws with distinct sub-apical tooth (Fig. 3AB). *Hemelytron*. Major cell triangular, minor cell very small.

Male genitalia (Fig. 4). Typical of *anthocoroides* group (Gorczyca 2002; Sadowska-Woda et al. 2008; Wolski et al. 2018, also see discussion below). *Right paramere*. Apical process thin and relatively long; spine

on inner surface of paramere body indistinct. *Aedeagus*. Sclerotized part of seminal duct broadened apically; endosoma with strongly developed, arcuate sclerite and large, elliptical sclerotised lobe on apical half.



Fig. 4. *Fulvius yunnanicus* sp. nov., holotype, male genitalia. A. Right paramere; B. Left paramere; C. Lateral view of endosoma; D. Dorsal view.

Female

Similar to male in colouration, structure, texture and vestiture.

Female genitalia (Fig. 5). Genital chamber (or bursa copulatrix) rounded; lateral oviducts short, slightly broad apically, ring-like sclerite near basal part of seminal depository rounded, protruding, prominent, broadly developed; sclerotized ring situated laterally, indistinct; posterior wall with wrinkled interrampal sclerite; membranous structure present between gonapophysis I.

Measurements (mm). ♂/♀ (holotype measurements first)

Body. Length 4.09/4.10, width 1.36/1.36.

Head. Length of head 0.79/0.79, width 0.61/0.66, dorsal width of eye 0.17/0.18, width of vertex 0.27/0.28.

Antenna. Length of segment I 0.51/0.52, II 1.14/1.19, III 0.51/0.51, IV 0.50/ missing in ♀.

Labium (unmeasurable in specimens examined).

Pronotum. Length 0.61/0.63, length of lateral margins 0.67/0.77, length of anterior margins 0.51/0.52, length of posterior margins 1.14/1.37

Distribution. China, Yunnan Province (Fig. 6).

Etymology. The specific epithet refers to the Chinese province Yunnan where the specimens were collected.

Remarks. Gorczyca (2002), Sadowska-Woda et al. (2008) and Wolski et al. (2018) summarized the morphological characters that define the three species groups that are currently found in the genus *Fulvius* Stål, 1862: the *anthocoroides*, *bifenestratus*, and *bisbistillatus* groups. The presented new species can easily be classified as a member of the *anthocoroides* group as it has the following characters: a) dorsum matte, covered with uniformly distributed setae (Fig. 1; Wolski et al. 2018: figs 41–44); b) second tarsomere not subdivided medially, subapical tooth present (Fig. 3A–B; Wolski et al. 2018: figs 45–46); c) the aperture of the pygophore is oriented posteriorly, with long dorsal wall (Wolski et al. 2018: figs 47–48); d) the parameres are similar in size, the right paramere has a relatively thick paramere body and a thin and short apical process; the left paramere has a relatively long apical process with a subapical incision (Fig 4A–B; Carvalho and Lorenzato 1978: figs 56–57, 68–69; Gorczyca 2002: figs 1–4; Pluot-Sigwalt & Chérot 2013: fig. 4B–C; Yasunaga 2000: figs 23–24, 28–29; Yasunaga and Wolski 2017: figs 3A–B); e) endosoma with sclerites or sclerotized appendages; the sclerotized portion of the seminal

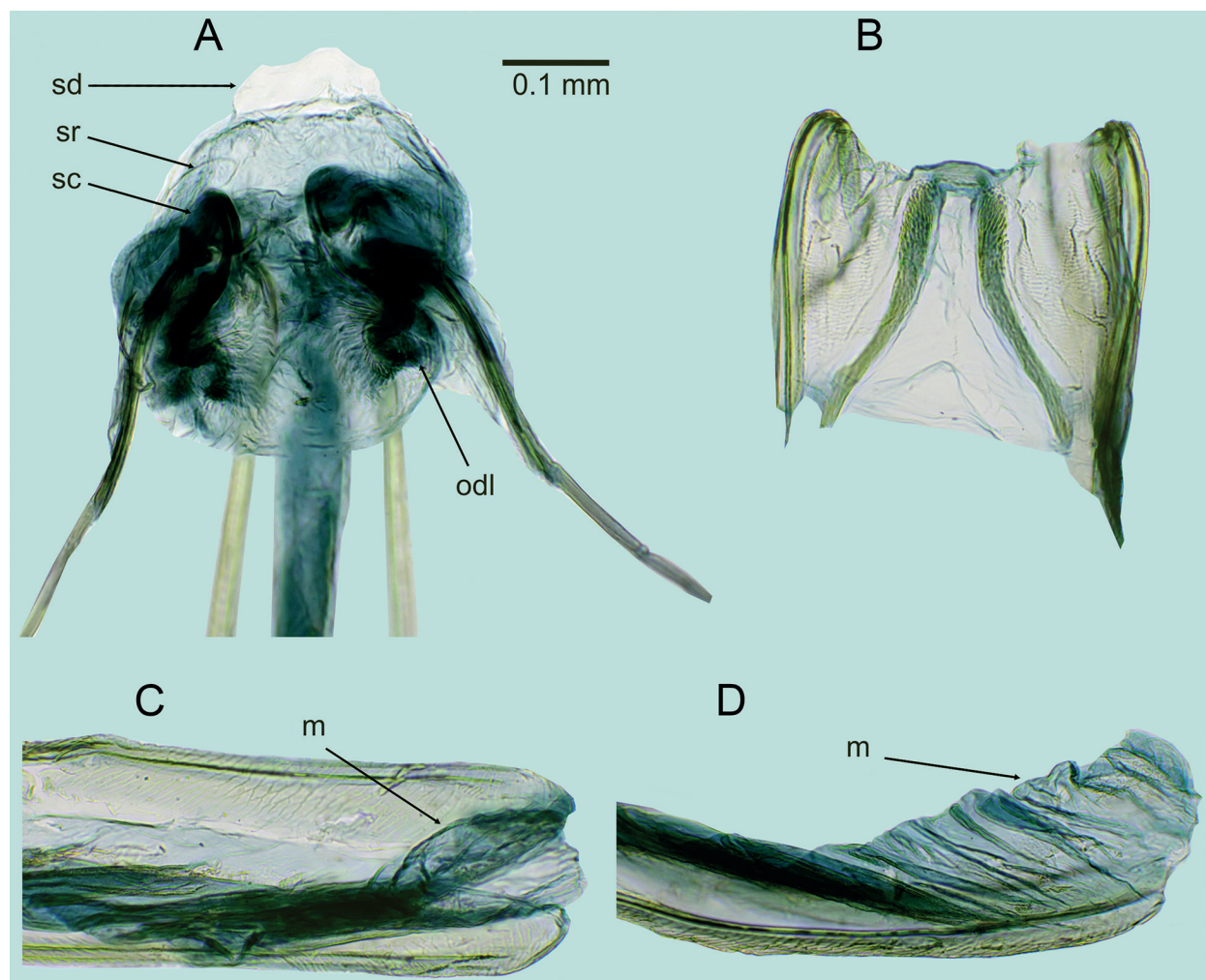


Fig. 5. *Fulvius yunnanicus* sp. nov., paratype, female genitalia: **A–B.** Genital chamber (or bursa copulatrix). **A.** Dorsal view; **B.** Posterior wall, anterior view; **C.** Gonapophysis I and adjacent structures, dorsal view; **D.** Gonapophysis I and adjacent structures, right lateral view. m = membranous structure adjunct to gonapophysis I; odl = lateral oviduct; sc = ring-like sclerite near basal part of seminal depository; sd = seminal depository; sr = sclerotized ring.

duct is well developed, long and tubular (Fig. 4C–D; Carvalho & Lorenzato 1978: fig. 55; Pluot-Sigwalt & Chérot 2013: fig. 4A; Yasunaga 2000: fig. 30; Yasunaga & Wolski 2017: fig. 3C) and f) a membranous structure is present between the gonapophysis I (Fig. 5C–D; Sadowska-Woda et al. 2008).

Within the *anthocoroides* group *F. yunnanicus* sp. nov. is most similar to the Oriental *F. mateusi* Sadowska-Woda & Gorczyca, 2008, *F. nigricornis* Poppius, 1909 and *F. tagalicus* Poppius, 1914. All these species have uniformly coloured hemelytron (e.g., Yasunaga 2000: fig. 19), not having any pale patch basally as it is found for example in *F. anthocoroides* (Reuter, 1875), *F. dimidiatus* (Poppius, 1909) or *F. ussuriensis* Kerzhner, 1973

(e.g., Yasunaga 2000: figs 18, 22; Yasunaga & Wolski 2017: fig. 2C). The present new species can, however, be easily distinguished from *F. mateusi*, *F. nigricornis* and *F. tagalicus* by having the pronotum with brown, longitudinal patches along entire length (Fig. 1) and the presence of the oval sclerotized lobe in the endosoma (Fig. 4C). From *F. mateusi* *F. yunnanicus* sp. nov. can be also distinguished by the antennal segment II with contrastingly yellow annulation apically (Fig. 1) (antennal segment II is uniformly dark brown in *F. mateusi*) and the presence of the ring-like sclerite near base of the seminal depository (Fig. 5A) which is lacking in *F. mateusi* (Sadowska-Woda & Gorczyca 2008: fig. 6).



Fig. 6. Distribution of *Fulvius yunnanicus* sp. nov.

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